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OF THE  
SPECIFIC CAUSE OF TYPHOID, TYPHUS,  
AND RELAPSING FEVER.

BY  
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[*From Volume XXXIII of the 'Medico-Chirurgical Transactions,'  
published by the Royal Medical and Chirurgical Society of  
London.*]

L O N D O N :  
PRINTED BY  
C. AND J. ADLARD, BARTHOLOMEW CLOSE.

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1850.



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COMMUNICATED BY  
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Received November 20th.—Read December 11th, 1849.

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THERE are certain diseases which have peculiarities common to all, so characteristic, that, although we are ignorant of their intimate nature, and even of their exact seat, yet they naturally group themselves together and form a class admitting of one general description. This class exhibits equally natural subdivisions. The species, of which these subdivisions are formed, are distinguished from each other by peculiarities even more marked, if possible, than the class in which they are included is from all other classes. The great class to which I refer is that of—

*Acute febrile diseases*, having a determinate duration, and dependent for their origin on specific causes.

It includes, as distinct species, smallpox, measles, scarlet fever, typhus fever, typhoid fever, and relapsing fever. For many years the first three were confounded under one name, and it was only after the publication of Dr. Withering's essay that measles and scarlet fever were regarded as distinct affections, i. e. distinct as to their course, their symptoms, their lesions, and their causes. The three last-enumerated diseases are yet, by many, looked on as but varieties of one

disease, which merely presents differences in its phases according to epidemic constitutions, individual peculiarities, and hygiènic conditions. The great work of Louis on the Typhoid Affection, by affording a standard of comparison, materially lightened the labour of separating from that disease those which had previously been grouped with it.

The paper of Dr. Gerhard, in the 'American Journal of Medical Sciences' for 1837; the cases collected by Dr. Shatmak, and so ably analysed by M. Valleix; and the excellent paper of Dr. Stewart, in 1840, rendered it highly probable, although they did not prove<sup>1</sup> that typhoid fever and typhus fever were absolutely distinct from each other, i. e. were two species of disease, and not varieties of one affection.

In the 'Monthly Journal' of the present year I have attempted to determine absolutely the question of their identity, by an analysis of the course, the symptoms and the lesions of structure found after death in a certain number of fatal cases, collected by myself during one epidemic. It appeared to me that the conclusion which flows from that analysis is, that, so far as concerns their course, symptoms, and lesions, no two diseases can be more distinct. But not only do the diseases, i. e. smallpox, measles, and scarlet fever, with which I have classed these fevers, differ from each other in course, symptoms, and lesions, but they differ also with respect to the nature of their exciting cause. That cause is specific. We can generate inflammation of any organ at will by a variety of means; but by the application of *one* cause only can we excite smallpox, measles, or scarlet fever. In like manner, typhoid fever, typhus fever, and relapsing fever must require for their production the application of distinct specific causes, if they be distinct diseases belonging to the same class as smallpox, &c.

<sup>1</sup> See Christison on Fever, Library of Medicine; Watson's Lectures, 2d edit.; and especially vol. xii, British and Foreign Medical Review, in which the arguments adduced by the above-mentioned and other authors in favour of the non-identity of typhoid and typhus fever are ably criticised, and the following conclusion arrived at: "That they are the *same species* of disease, but *different* varieties of that species."

The peculiarity which entitles a cause to be termed specific, is that of exciting in those exposed to its action one, and only one, species of disease. Further, all specific causes, the products of individuals labouring under disease, can excite in other individuals only diseases resembling in all essential characters those present in the individual from whom they themselves sprung. Herein lies the test, the *experimentum crucis* by which the absolute non-identity of smallpox, measles, and scarlet fever is proved; for if the same cause, i. e. the poison generated by either, could not only produce the disease from which it had its origin, but also the other two, then the three affections would be regarded as varieties of one disease, and not as distinct species; just as *scarlatina simplex* and *anginosa*, and *scarlatina sine eruptione*, are varieties of each other; and just as *rubeola vulgaris*, *rubeola sine catarrho*, and perhaps it may be said, certain catarrhs without rubeoloid eruption are varieties of each other. We know, however, that smallpox, measles, and scarlet fever, owe their origin to different specific causes, and therefore we assert that they are distinct diseases. If the same difference in the specific cause of any two other affections be observed, then, however trivial the differences in their symptoms, they too must be held to be distinct diseases; *à fortiori*, will this be true of diseases differing from each other so widely as typhoid, typhus, and relapsing fever, in course, symptoms, sequelæ, and pathologico-anatomical lesions?

The object of this paper is to inquire, whether the specific cause of the three diseases just enumerated is identical?

The materials used for the solution of the question are the cases admitted into the London Fever Hospital during the years 1847, 1848, and 1849.<sup>1</sup>

The diagnosis of relapsing fever rests on the peculiarity of its course and symptoms; of typhoid and typhus fevers, on the skin eruption when present. The following are the diagnostic symptoms of these affections:

<sup>1</sup> To the medical officers of this institution, and especially to Dr. Tweedie, I am indebted for the liberality with which I have been permitted to make unrestrained use of the cases admitted into its wards.



RELAPSING FEVER.—Sudden rigors, headache, skin hot and dry, tongue white, urine high-coloured, bowels regular, occasional or frequent vomiting, loss of appetite, absence of abnormal physical abdominal signs. In severe cases, jaundice, profuse sweating on about the seventh day, followed by apparent restoration to health; on from the fifth to the eighth day, reckoning from the apparent convalescence, repetition of the original symptoms, with greater or less severity; again terminating in sweating, and then permanent convalescence.

TYPHOID FEVER—*Rose spots*.—The eruption in typhoid fever appears from the seventh to the twelfth day of the disease, very rarely later, and still more rarely at an earlier period. The characteristic spots are frequently preceded for a day or two by a very delicate scarlet tint of the whole skin.<sup>1</sup> The eruption itself consists of small spots irregularly scattered over the anterior and posterior surface of the trunk. The number of spots on the surface at one time ordinarily varies from six to twenty; sometimes there are very few, at other times, but infinitely more rarely, they are so thickly seated that scarcely an interval of normal cuticle is left between them.

The separate spots are circular, and of a bright rose-colour; this hue passes insensibly at their basis into that of the surrounding cuticle. Their usual diameter is about two lines. They are somewhat elevated; but, although perceptible to the finger passed lightly over the surface, they possess none of the seed-like hardness of the first day's eruption of smallpox, nor are they so prominent and perceptible to the touch as the papulæ of lichen. Their surface is rounded, lens-shaped, never acuminated. No trace of vesication can be detected on their apices. If tolerably firm pressure be made on these spots, they entirely disappear; but they resume their distinctive colour and elevation as the finger is being withdrawn. The above characters are pre-

<sup>1</sup> This tint closely resembles, as I have elsewhere remarked, that of the skin of a person soon after leaving a hot-bath. It is important to be acquainted with it, because when it is more marked than usual, and sore throat is also present, it may be mistaken for the rash of scarlet fever.



served by each spot from its first appearance till it disappears. When, however, the duration of a spot is prolonged to five or six days, it usually becomes before that time very small, and less bright in colour; still, however, it disappears on pressure. The ordinary duration of each spot is about two days, but it varies from two to six days. Fresh spots appear every day or two from the outset of the eruption, till from the twenty-first to the twenty-eighth day of disease. This successive daily eruption of a few small, very slightly elevated, rose-coloured spots, disappearing on pressure, each spot continuing visible for three or four days only, is, so far as I know, peculiar to, and absolutely diagnostic of typhoid fever.

TYPHUS FEVER—*Mulberry rash*.—The eruption in typhus fever appears on from the fifth to the seventh day, and reaches its maximum amount in a day or two. It occupies the trunk and extremities, and occasionally the face. It consists of distinct spots and a subcuticular rash.

The frequent absence of one of these elements of the mulberry rash, the different proportions they bear to each other, the depth of hue of either, as well as the changes they undergo in their physical characters, cause considerable variations in the appearance of the rash in individual cases.

*1st. Distinct spots.* The spots vary in number. Sometimes they are very few, and pretty equally diffused over the whole surface; at others, while there are but few spots on the anterior surface of the trunk, the posterior is covered; or again, they may be innumerable anteriorly as well as posteriorly, ordinarily they are very numerous. Their size varies from a mere point to two, three, or four lines in diameter. Sometimes two or three spots coalescing, give rise to very large irregularly-shaped patches. Each spot passes through two, and in many cases, three stages.

*First stage.*—The spots on their first appearance are slightly elevated, somewhat flattened on their surface; have a dusky pinkish-red colour, somewhat like the stains of mulberry juice; and disappear completely on pressure, resuming their distinctive appearances as the finger is being

withdrawn. *Second stage*.—In from one to three days these spots undergo a marked change; they are no longer elevated above the level of the cuticle; their hue grows darker and more dingy; and instead of disappearing on pressure, they only fade, i. e. when the finger is firmly pressed on them they grow paler, but do not entirely disappear. In some cases the spots, after reaching this stage, pass into faintly marked, reddish-brown stains, and then vanish. *Third stage*.—In many cases, and especially those that are severe, the spots reach a third stage; their centres become dark purple, and are unaltered in appearance by the firmest pressure, although their circumferences still fade; frequently entire spots, circumference as well as centre, change into petechiæ.

The duration of each of the above-described spots is from its eruption till the termination of the disease. But a few large, almost scarlet patches, are occasionally seen on the back of the hand on the fifth or sixth day of the disease; these usually disappear altogether in a day or two.

*The Subcuticular Rash*.—When the trunk is covered with mulberry rash, many of the spots are usually pale, very imperfectly marked as spots, and run into each other; these spots are seen indistinctly, as if situated beneath the cuticle; or as the vulgar say, are “not well out.” They give to the skin a mottled aspect, and on this mottled surface, as on a ground, the darker, more distinct, and decidedly marked spots are situated. Like the distinct spots, the subcuticular rash is deepest coloured on the most depending parts of the body.

The subcuticular rash may precede or be preceded for a day or two by the distinct spots, i. e. the eruption is for a day or two very pale, and then some spots grow more distinct, or a few well-marked spots first appear, and then after a day or two the rash becomes more abundant. The diagnostic characters which separate the spots of typhoid from those of typhus fever are then derived from the colour, shape, duration, and the changes in physical characters which each spot severally experiences in the course of these diseases.

All the cases in which two or more persons suffering from typhus fever, typhoid fever, and relapsing fever, were admitted from the same house, into the London Fever Hospital, in 1847.  
This table exhibits the age, sex, degree of intimacy of the individuals, and the nature of the disease under which they laboured.

Months.	Rose spots.	Mulberry rash.*	Months.	Ages of males.	Ages of females.	Degree of intimacy.	Nature of disease.	Remarks.
May . . . .			May . . . .	30, 32 .	28 . . . .	Lodgers . . . . .	Typhus fever . . .	All mulberry rash.
July . . . .			July . . . .	{ 25 . . . . 17 . . . .	20 . . . . 20, 33 .	Husband and wife . . . . . Brother, sister, and sister-in-law . . . . .	Relapsing fever . . . Typhus fever . . .	No spots.
September			September	{ 14, 19 21 . . . . 22 . . . .	. . . . . 24 . . . . 16, 21 .	Brothers . . . . . Brother and sister . . . . . Niece and aunt . . . . .	Typhoid fever . . . Typhus fever . . . Typhus fever . . .	Both had rose spots. Both had mulberry rash. Both had mulberry rash.
October . .			October . .	{ 16 . . . . 55 . . . . 40 . . . .	24 . . . . 34 . . . . 35 . . . .	Husband and wife . . . . . Mother and daughter . . . . . Husband and wife . . . . .	Relapsing fever . . . Relapsing fever . . . Relapsing fever . . .	No spots. No spots. No spots.
November			November	{ 13 . . . . 21, 23 .	36 . . . . 13 . . . .	Husband and wife . . . . . Brothers . . . . . Sisters . . . . .	Relapsing fever . . . Typhus fever . . . Typhoid fever . . .	No spots. Both had mulberry rash. Both had rose spots.

\* I have no means of determining these particulars for 1847.

Number of cases admitted into the London Fever Hospital, during the separate months of 1848, with				All the instances in which two or more cases of typhus, typhoid, and relapsing fever were admitted from the same house, into the London Fever Hospital, in 1848. This table shows the age, sex, degree of intimacy of the individuals and the nature of the disease under which they laboured.				
Month.	Rose Spots.	Mulberry Rash.	Month.	Ages of Males.	Ages of Females.	Degree of Intimacy.	Nature of Disease.	Remarks.
January .	8	30	January .	{ 22 . . .	. 22 . . .	Husband and wife .	Typhus fever .	The man had mulberry rash, the wife no spots.
February .	8	27	February .	{ 30 . . . 14 . . . 13, 50 .	. 24 . . . . 11, 33 . . . 7, 11, 43 . . 35 . . .	Brother and sister . Mother and daughter . Mother and three children . Father, son, and sister-in-law .	Typhus fever . Typhus fever . Typhus fever . Typhus fever .	Both mulberry rash. The child had no spots. All mulberry rash.
March . .	5	43	March . .	{ 5, 15 . . . 8 . . . 13, 19 . . . 5 . . .	. 13, 44 . . . . 30 . . . . 16, 20, 45 . . 13, 44 . .	Mother and three children . Mother and son . . . Mother and four children . Mother and two children .	Typhus fever . Typhus fever . Typhus fever . Typhus fever .	All mulberry rash. The infant was convalescent, the mother had mulberry rash, the two elder children no eruption. Child had no eruption. All mulberry rash. Mother mulberry rash, children no eruption.
April . .	4	48	April . .	{ 18, 27 . . . 20 . . .	. 8, 18, 20, 24 . . . 26, 49 . . . 9, 17, 35 . . . 12, 42 . . . 16 . . .	Sisters and lodger . Slept in the same room . Mother and daughter . Mother and daughters . Mother and daughter . Brother and sister .	Typhus fever . Typhus fever . Typhus fever . Typhus fever . Typhus fever . Typhus fever .	All mulberry rash. Both mulberry rash. Both mulberry rash. All mulberry rash. Both mulberry rash. The boy had mulberry rash, the girl no eruption.
May . . .	3	47	May . . .	{ 20, 21 . . . 19, 58 . . .	. 19 . . . . 11, 18, 33 . . . 39 . . .	Brothers and sister . Occupied the same room . Father, mother, and son .	Typhus fever . Typhus fever . Typhus fever .	The sister had no eruption, brothers mulberry rash. The child had no spots, the others mulberry rash. All mulberry rash.



June . .	10	35	June . .	17, 25 . 11, 38 .	. . .	Slept in the same room Father and son .	Typhus fever . Typhus fever .	Both mulberry rash. Father mulberry rash, son no spots.
July . .	11	37	July . .	12, 15, 42 19 . 30, 40, 45	. . .	Father, sons, lodger Brother and sister Inmates of the same ward at workhouse . Brothers . . .	Typhus fever . Typhus fever . Typhus fever . Typhus fever . Typhus fever .	All mulberry rash. Both mulberry rash. All mulberry rash. Elder mulberry rash, younger no spots.
August . .	11	25	August . .	15, 44 . 47 . 12, 17 . 11, 14 . 4, 10, 13, 42 . 6½ .	. . .	Father and son . Mother and daughter Husband and wife Brothers . . . Mother and children Father and children	Typhoid fever . Typhus fever . Typhus fever . Typhus fever . Typhus fever . Typhus fever .	Both had rose spots. Both mulberry rash. Both mulberry rash. Both mulberry rash. All mulberry rash. Father and daughter had mulberry rash, the three boys no spots.
September .	22	32	September .	5, 6 . 11, 33 . 12 . 13 .	. . .	Sisters . Husband, wife, and child Brother and sister Brother and sister	Typhoid fever . Typhus fever . Typhoid fever . Typhoid fever .	Both had rose spots. All had mulberry rash. Both had rose spots. Both had rose spots.
October .	16	18	October .	16, 46 .	. . .	Father and son .	The father ty- phus fever . The son ty- phoid fever .	Mulberry rash.
November .	13	38	November .	19, 21, 29 .	7, 14, 20, 22, 60	Inhabitants of one house	Typhus fever .	Rose spots. The youngest child had no spots, the other seven had mulberry rash.
December .	7	10	December .	26, 54 . 7, 23, 52	. . .	Whole family . Whole family .	Typhus fever . Typhus fever .	All mulberry rash. All mulberry rash.

Number of cases admitted into the London Fever Hospital, during the separate months of 1849, with			All the cases in which two or more persons suffering from typhus fever, typhoid fever, and relapsing fever were admitted from the same house into the London Fever Hospital in 1849. This table exhibits the age, sex, degree of intimacy of the individuals, and the nature of the disease under which they laboured.					
Month.	Rose Spots.	Mulberry Rash.	Month.	Ages of Males.	Ages of Females.	Degree of Intimacy.	Nature of Disease.	Remarks.
January .	9	24	January .	{ 9, 37 . 25 . 26, 30 .	. . 22, 30 . 25 .	Father and son . Husband, wife, and lodger Husband, wife, and lodger	Typhus fever . Typhus fever . Typhus fever .	Both had mulberry rash. All had mulberry rash. All had mulberry rash.
February .	6	18	February .	{ 14, 50 . 10, 48 . 9, 14 .	. 47 . . . . . . . 16, 38, 53	Husband, wife, and child Father and son . Mother, children, and aunt	Typhus fever . Typhus fever . Typhus fever .	All had mulberry rash. Both had mulberry rash. The child, æt. 9, had no spots. All the rest had mulberry rash.
March .	5	22	March .	{ 10, 17 . 6, 8, 29 . . . . . .	. . . . . . . . . . . 53, 61	Brothers . Father and sons . Occupied the same room	Typhoid fever . Typhus fever . Typhus fever .	Both rose spots. All mulberry rash. Both mulberry rash.
April .	4	15	April .	{ 24, 24, 28, 29, 31 6, 21 .	26 . . 35, 40	Same room, lodging house Mother, children, and nurse	Typhus fever . Typhus fever .	All mulberry rash. All mulberry rash.
May .	4	16	May .	{ 12 . 21 .	. 9, 16, 21 . 21 .	Brother and sisters . Husband and wife	Relapsing fever . Typhus fever .	All mulberry rash. Both had mulberry rash.
June .	11	12	June .	. . . . .	{ 12, 44 20, 30	Mother and daughter . Sisters .	Typhus fever . Typhus fever .	Both had mulberry rash. Both had mulberry rash.
July .	16	6	July .	{ 21, 15 . 42 .	. 18, 18, 51 . 9 . . 49 .	Visitors, lived in the same court Brothers and sister Husband and wife .	Typhoid fever . Typhus fever . Typhus fever .	Both had rose spots. All had rose spots. All had mulberry rash.
August .	15	8	August .	{ 10, 13, 16 16 .	. . . . . . 13, 54	Brothers . Mother and Children .	Typhus fever . Typhoid fever .	Both had mulberry rash. All had rose spots.
September	15	11	September	{ . . . . . 40 .	. 13, 16, 54 . 47 .	Mother and Daughters . Husband and wife .	Typhus fever . Typhus fever .	All had mulberry rash. Both had mulberry rash.
October .	23	6	October .	. . . . .	. 23 .	Master had fever, diarrhœa, and passed blood .	Typhoid fever	Rose spots.
November	10	5	November	{ 40, 40 . 9, 12, 22 .	. 12, 34 . . . . .	Husband, lodger, wife, and child Brothers	Typhoid fever Typhus fever . Relapsing fever	Rose spots. All had mulberry rash.



Into these tables are collected *all* the cases in which more than one of a family, or more than one inhabitant of a house, suffering from Typhoid, Typhus, or Relapsing Fever, were admitted into the London Fever Hospital, during the periods specified.<sup>1</sup>

It will be observed, that in 1847 there were admitted into the London Fever Hospital two or more cases of typhus fever from each of five separate localities; that two cases of typhoid fever were received from either of two localities; and two cases of relapsing fever from each of five distinct localities. Twelve cases of typhus fever having been brought from five houses, four cases of typhoid fever from two houses,

<sup>1</sup> I ought to qualify the expression "*all* the cases," because it was not till the year 1848 that the diagnosis between these diseases was made with reference to *all* the cases admitted into the Hospital. The consequence is that not only are there no data for determining the numbers of each of the three affections received into the Hospital during 1847, but there are no data for determining, in many instances, to which of the three diseases any given case ought to be referred; i. e. the past histories of particular cases were only partially obtained, the exact locality from which the patient came was not recorded, the name of the street, or even parish, being often all that was ascertained. I have, therefore, been obliged to omit very many cases received into the Hospital in 1847; but I have included *all* those of which the records available for my purpose permitted the diagnosis to be made, and the locality from which the patient came, to be learned. In 1848, comparatively very few cases were admitted of which the diagnosis was not recorded, and the exact residence ascertained; and during 1849, the greatest care was taken to ascertain the locality from which each case was received. Since the middle of 1848, the diagnosis of the cases here used has been made or verified in nearly every instance by myself. In 1849 in every case. Before the middle of 1848, the characters of the spots were in many cases recorded by my friends Mr. Sankey, or his assistant, Mr. Humphrey, i. e. if two of one family entered the Hospital, the notes of one of the cases were frequently taken by either of those gentlemen, while I kept record of the other; this fact I regard as valuable, because it was only on collating these notes, eighteen months after they were made, that I became aware of many of the facts embodied in this paper.

and ten cases of relapsing fever from five houses, in the course of six months. During the same time not a single example was observed of either disease communicating the other, or of cases of the three diseases, or even of two of them, being generated by the same cause. All these diseases, be it remembered, prevailing in this city at the same time.

During the year 1848 there were admitted into the London Fever Hospital two or more cases, one of which presented the symptoms of typhus fever, from each of thirty-four localities. These thirty-four foci of disease yielded on the whole 101 cases. During the same year, more than one fourth of the cases of fever received into the Hospital were examples of typhoid fever, therefore one fourth, i. e. twenty-five of the 101 cases ought, if typhoid and typhus fevers are but varieties of each other, to have presented the symptoms of typhoid fever;<sup>1</sup> but, as the above tables show, in one instance only were two patients, one of which laboured under typhoid, and the other under typhus fever, brought from the same house. The cases referred to are those of a man *æt.* 46, who was admitted October 10th, 1848, with well marked typhus fever, and his son, *æt.* 16, who had been received into the Hospital

<sup>1</sup> Although one could not have expected the cases of typhoid and typhus fevers, that is to say, supposing their cause was identical, admitted from any locality, to have borne to each other the exact proportion that the total numbers of the cases of either disease, admitted into the Hospital during the same period of time, did to each other, yet an approach to that proportion ought absolutely to have been present in a majority of instances; while if occasionally the cases of either disease were proportionally too few, they would on other occasions have been, if derived from the same cause, proportionally too many. I have, therefore, used the relative proportion of the cases of the two diseases admitted into the Hospital as a standard. It appears to me that correct conclusions are, in a question of the nature considered in the text, more likely to be arrived at by cumulative evidence, such as is above adduced, than by the application of the calculus of probabilities to any one number of cases, however large that number might be.

on September 19th, with equally well marked typhoid fever. The diagnosis of the latter case was made by my friend Mr. Humphrey. I verified the diagnosis in the case of the father. But in this apparent exception to the rule, the mother of the boy had visited him in the Hospital, and therefore might have carried the contagion of typhus fever to her husband. The father, moreover, had been little exposed to the contagion emanating from the son, because the latter, a vagabond, at variance with his father, was from home when he was taken sick.

From January 1st to November 26th, 1849, there were received into the Hospital two or more cases, of which one presented the symptoms of typhus fever, from each of eighteen separate localities. These eighteen localities afforded fifty-one cases. During the same eleven months nearly half the cases received into the Hospital were suffering from typhoid fever. The whole number of cases admitted was 262; of typhoid fever, 116—of typhus fever, 143—therefore nearly half, or exactly 22·6 of the 51 cases admitted from the eighteen localities ought to have had typhoid fever, i. e., if the cause of the two fevers is identical, while, as the above tables show, not one of the 51 presented the symptoms of that disease.

We see from these tables, moreover, that in 1848, two cases of fever, one of which presented the symptoms of typhoid fever, were admitted from each of five distinct localities; now, as rather more than three fourths of the cases admitted into the Hospital during the same year, laboured under typhus fever, the remaining five of the ten ought to have had typhus fever, but one only did so. To this apparently exceptional case I have before referred.

From January 1st to November 26th, 1849, two or more cases, one of which was suffering from typhoid fever, were received into the Hospital from four localities, in the whole ten cases. Seeing that rather more than half the cases admitted into the Hospital during the same period had



typhus fever, the remaining ten cases ought to have presented the symptoms of typhus fever, if, as I have before observed, the cause of the two diseases is identical. But in not a single instance was a case of typhoid fever and a case of typhus fever admitted into the Hospital, from the same house, during the eleven months of 1849.

The foregoing tables demonstrate, that in every month of 1848 and 1849, several cases of typhoid fever and typhus fever were admitted; that the epidemic constitution favorable to the spread of typhus fever had little influence in diminishing or increasing the absolute number of cases of typhoid fever;—thus, during the first eight months of 1848, 60 cases of typhoid fever, and 292 cases of typhus fever were admitted into the Hospital; and during the corresponding months of 1849, 70 cases of typhoid fever, and 121 only of typhus fever; so that, while the cases of the latter disease had diminished nearly three fifths, the cases of the former had increased only one sixth.

As some writers have asserted that there are certain transition cases to be observed, marking the passage of one epidemic constitution into another, I ought here to remark, that with reference to the characteristic peculiarities of typhoid fever, and the rose spots in particular, they were as well marked in the autumn of 1846, as during the epidemic of relapsing fever in 1847, or of typhus in the autumns of 1847 and 1848, or as they are at the present moment. The spots have undergone no change, have experienced no modification; although the epidemic constitution, on which the difference in the rash is said to depend, must have varied more than once. The same is true of the mulberry rash of typhus fever. It presented, in the few cases observed in 1846, the same characters as during the epidemic of 1847-48; the same characters during that epidemic as at the present moment, when the number of the cases of typhoid fever bear to that of typhus fever the proportion of three to one.

So with regard to the intestinal lesion. In all the fatal cases examined in the three years referred to, in which the mulberry rash existed during life, Peyer's patches, and the mesenteric glands were absolutely free from disease, and in every fatal case in which rose spots were noted during life, serious lesion of the agminated and mesenteric glands was discovered after death. The lesion, like the eruption, was quite unmodified by that epidemic constitution which favoured the spread of typhus fever in 1847 and 1848;—for example, although the constitution of the autumn of this year (1849) favoured the spread of typhoid fever, yet, when a man and his wife were admitted in August with typhus fever, the mulberry rash preserved its characteristics unmodified, and when they died, as both did, Peyer's patches and the mesenteric glands were found to possess their normal anatomical characters.

There are a few cases included in the preceding tables, which may here be more fully adverted to with advantage. In November and December 1848, forty-eight cases of typhus fever, and twenty of typhoid fever, were admitted into the Hospital, i. e., nearly one third of the patients were affected with typhoid fever. At the latter end of October, 1848, a boy, 14 years of age, went to reside with a family named Mitchell, in Adden Place, St. Paneras. The Mitchells were at that time in health. The boy left his own home because his brothers were "down with the fever." This lad was, early in November, admitted into the Hospital, suffering from typhus fever. Early, also, in the same month, the man Mitchell, aged 29 years, with whom the boy lodged, the man's daughter, aged 7 years, and a female lodger, aged 22, were also admitted with typhus fever. The other members of Mitchell's family, expelled from Adden Place, then removed to 21, Hertford Street, at least a mile from their former residence. At this time, so far as I could learn by personal inquiry, there was no fever in Hertford Street, and *certainly* none in the house in which they had taken up their

residence. On November 22d, the two sisters of Mitchell's wife, aged respectively 14 and 22, who had removed from Adden Place with Mrs. Mitchell and her infant, aged 4 years, were received into the Hospital, both suffering from typhus fever. On December 8th, the landlady of 21, Hertford Street, aged 60 years, was admitted with very severe typhus fever; and on December 20th, the son-in-law of the landlady was also admitted with the same disease. I subsequently saw Mitchell's infant, aged 4 years, at its own home; it was similarly but very slightly affected. The only member of the family that escaped was the woman Mitchell, and she had had "spotted typhus fever," according to her own voluntary statement, some few years before.<sup>1</sup> Here was a group of persons, whose ages varied from four to sixty years, and whose constitutional predispositions also must have varied infinitely, for there were several of them unconnected by blood, exposed to the poison of typhus fever, (introduced among them by the lad aged 14,) at a time when typhus fever was only twice as prevalent as typhoid fever. What was the result? Did one third of the eight have typhoid fever? No, not one.

In December, 1848, ten cases of typhus fever and seven of typhoid fever were admitted into the Hospital. Five cases came from one house; these five individuals varied in age from 7 to 52 years,—their degree of relationship was, grandfather, daughter, and three grand-children. All five

<sup>1</sup> I may here observe that I have never known the same individual to be affected twice with typhus fever. The same person has been admitted twice, or, indeed, oftener, into the London Fever Hospital. But on reference to the Hospital records, or to my own notes, I have invariably found that such persons had at the one time a different disease from that present at the other. Thus two boys were admitted, Sept. 1849, with typhus fever; they had been inmates of the Hospital in 1846. Reference to the Hospital records of that year proved that they then had relapsing fever. I know no evidence, I repeat, to prove that typhus fever attacks the same individual *twice* more frequently than typhoid fever.



had well marked mulberry rash, were unequivocally affected with typhus fever. It is evident that, as at this time, the number of those admitted with the two diseases was pretty nearly equal; two of these five ought, if the cause of the two diseases is identical, to have had typhoid fever, with rose spots.

In March and April, 1849, eight cases of typhoid fever, and thirty-one cases of typhus fever, were admitted into the Hospital. Between the 19th of March and the 10th of April, eight persons were brought to the Hospital from one room, suffering from fever. Did one fourth present the rose spots of typhoid fever? No, not one—all had well marked typhus fever.

In September, October, and November, 1849, eighteen cases of typhus fever, and forty-eight cases of typhoid fever, were received into the Hospital, *i. e.*, nearly three times as many cases of typhoid fever as of typhus fever. During the same three months, a mother and her two daughters, aged respectively 54, 16, and 13; a husband and wife, aged 40 and 47; a husband, wife, child, and lodger, aged severally 40, 39, 12, and 40—*i. e.*, in all nine persons, were brought from three localities. At least five ought to have had typhoid fever, if that affection and typhus fever are due to the same specific cause. Was it so? No, in every case the persons secondarily affected, whatever their age or sex, had the same disease as the individual from whom they caught it.

In April, 1849, a girl, suffering from relapsing fever was brought from a house in Fulham—in a few days her brother and two sisters were admitted into the Hospital. Did either of the three latter have typhus fever, which was the prevailing disease, or typhoid fever, which was then also very much more widely-spread than relapsing fever? No; all had the same fever.

Although not absolutely necessary for the purpose of my argument, I may observe that I have visited, in a few in-

stances, the houses<sup>1</sup> from which more than one individual affected with typhoid fever, or typhus fever, were brought to the Hospital, without being able to detect any hygiënic differences in the condition of the people, or in the localities themselves to modify the exciting cause.

Before concluding, it will be well summarily to repeat, that in 1848, one fourth of the cases admitted into the Hospital had typhoid fever; while, from thirty-four foci of typhus fever, yielding 101 cases, there was brought to the Hospital once only a case of typhus fever and a case of typhoid fever from the same house; and during the same time, among five localities, affording nine cases of typhoid fever, one locality only, viz. the house from which the father and son before referred to were brought, yielded a case of typhoid and one of typhus fever. That in 1849, although eighteen foci of typhus fever yielded fifty-one cases, and four foci of typhoid fever afforded ten cases, not a single example of the two diseases being received into the Hospital from one house occurred. With reference to the exceptional case, I must observe, that for exceptional cases to be of any value in proving the identity of typhus fever and typhoid fever, they must be met with more frequently than similar exceptional cases are met with in diseases having a specific cause, universally acknowledged to be different.

Now, the following facts prove that, with respect to measles, scarlet fever, and typhus fever, such exceptional cases are as frequent as with respect to typhoid and typhus fevers. During the last three years I have seen a case of typhus fever brought into the Hospital from a house in which all the children were suffering from measles; another case of typhus fever brought from a house in which the children had scarlet fever; a girl admitted with scarlet fever, who

<sup>1</sup> These houses were situated in courts or streets in the City, Bethnal Green, St. Pancras, and Holborn. I visited too few and made too imperfect inquiries to draw any *strict* inferences, but my *general* impression is stated in the text.

had been on terms of intimacy with another girl admitted shortly before with typhoid fever. And in these cases no direct contagion for the diseases under which the patients laboured could be traced. It is also important to observe, that the cases of scarlet fever admitted during the time specified, were nothing like so numerous as the cases of typhus fever or of typhoid fever.

The facts contained in this paper appear to me to prove, incontestably, so far as induction can prove the point, that the specific causes of typhus and typhoid fevers are absolutely different from each other, and to render in the highest degree probable, that the specific cause of relapsing fever is different from that of either of the two former. I have elsewhere, as I stated at the opening of this paper, attempted to prove that the course, the symptoms, the lesion, and the sequelæ of typhoid and typhus are different, and as relapsing fever differs from both too widely, so far as symptoms and course are concerned, to be confounded with them, it follows that if smallpox be separated from measles, and both from scarlet fever, because their course, symptoms, lesions, and specific cause are different, so must, for like reasons, typhoid fever, typhus fever, and relapsing fever be separated from each other, and regarded as absolutely distinct diseases, not merely varieties of each other, as are scarlatina anginosa and scarlatina sine eruption, but distinct species of disease, as are scarlatina, rubeola, and variola.

I have, throughout this paper, expressed myself as if the specific cause respectively of typhoid fever, typhus fever, and relapsing fever, was an influence emanating from the bodies of those affected with either disease. With respect to the contagious nature of typhus fever, I know no one who entertains a doubt. If typhoid fever be contagious, it is infinitely less so than typhus fever. My experience leads me to regard it as contagious. Those who believe typhoid fever to be non-contagious while they admit the contagious nature

of typhus fever, cannot for a moment doubt the difference in the specific causes of the diseases. It would not, it ought to be observed, have weakened the force of the facts adduced if I had regarded these diseases as non-contagious, because the question here considered is not how the individuals respectively got the disease, but if the same cause, whether contagion or any other, can produce typhoid fever, typhus fever, and relapsing fever.









